WHAT IS CLAIMED IS:

1. A nanocomposite for use in dental applications, the nanocomposite comprising:

a plurality of silicate platelets;

one or more regions spacing the plurality of silicate platelets from each other;

at least one surface modifier ion-exchanged to each of the plurality of silicate platelets; and

a dentally compatible resin absorbed into the regions spacing the plurality of silicate platelets, the platelets and resin forming an intercalated or exfoliated structure.

2. A nanocomposite intermediate for use in dental applications, the nanocomposite intermediate comprising:

a plurality of silicate platelets;

one or more regions spacing the plurality of silicate platelets from each other;

at least one surface modifier ion-exchanged to each of the plurality of silicate platelets; and

a dentally compatible resin absorbed into the regions spacing the plurality of silicate platelets.

3. A nanocomposite according to Claim 1 prepared by the process comprising:

providing a plurality of silicate platelets having one or more regions spacing the plurality of silicate platelets from each other;

ion-exchanging at least one surface modifier to the surface of each of the plurality of silicate platelets;

absorbing a dentally compatible resin into the regions spacing the plurality of silicate platelets; and

modifying the dentally compatible resin such that an intercalated or exfoliated structure is created.

4. A nanocomposite intermediate according to Claim 2 prepared by the process comprising:

providing a plurality of silicate platelets having one or more regions spacing the plurality of silicate platelets from each other;

ion-exchanging at least one surface modifier to the surface of each of the plurality of silicate platelets; and

absorbing a dentally compatible resin into the regions spacing the plurality of silicate platelets.

5. A method of making a nanocomposite according to Claim 1 comprising the steps of:

providing a plurality of silicate platelets having one or more regions spacing the plurality of silicate platelets from each other;

ion-exchanging at least one surface modifier to the surface of each of the plurality of silicate platelets;

absorbing a dentally compatible resin into the regions spacing the plurality of silicate platelets; and

modifying the dentally compatible resin such that an exfoliated structure is created.

6. A method of making a nanocomposite intermediate according to Claim 2 comprising the steps of:

providing a plurality of silicate platelets having one or more regions spacing the plurality of silicate platelets;

ion-exchanging at least one surface modifier to each of the plurality of silicate platelets; and

absorbing a dentally compatible resin into the regions spacing the plurality of silicate platelets.

7. A method of using a solid nanocomposite for dental applications, the method comprising the steps of:

providing a solid nanocomposite, the nanocomposite comprising: a plurality of silicate platelets; one or more regions spacing the plurality of silicate platelets from each other; at least one surface modifier ion-exchanged to each of the plurality of silicate platelets; a dentally compatible resin is absorbed into the regions spacing the plurality of silicate platelets, and the platelets and resin forming an intercalated or exfoliated structure.

8. The nanocomposite of Claim 1 wherein said plurality of silicate platelets is selected from the group consisting of smectite clay, vermiculite, halloysite, a mixed layered clay, a mica or sericite.

9. The nanocomposite of Claim 8 wherein said smectite clay is selected from the group consisting of montmorillonite, laponite, saponite, beidellite, nontronite, hectorite, swellable mica based mineral, stevensite or any synthetic analog thereof.

10. The nanocomposite of Claim 8 wherein said silicate platelets are used in conjunction with an additive.

11. The nanocomposite of Claim 10 wherein said additive is selected from the group consisting of quartz filler, glass filler, 2,4-dihydroxy benzophenone, 2,6-di-*tert*-butyl-4-methylphenol, color pigments, initiators, polymerization accelerators, titanium

dioxide, aluminum oxide, fumed silica, photoinitiators, plasticizers, ultra-violet light absorbers and stabilizers, and anti-oxidants.

12. The nanocomposite according to Claim 1 wherein said gallery region spacing is in the range of 3.5Å-200Å.

13. The nanocomposite according to Claim 1 wherein the at least one surface modifier is an organic cation.

14. The nanocomposite according to Claim 13 wherein said organic cation is selected from the group consisting of Bis(2-Hydroxyethyl) methyl tallow quaternary ammonium ion, dimethyl-2-ethyl hexyl hydrogenated tallow quaternary ammonium ion, methyl dihydroxyethyl hydrogenated tallow ammonium, aminododecanoic acid, polyoxyethylene decyloxypropylamine, and octadecyl trimethyl amine.

15. The nanocomposite according to Claim 13 wherein the at least one surface modifier is used in combination with bifunctional coupling agents or silanes.

16. The nanocomposite according to Claim 15 wherein said bifunctional coupling agent is a methacryloxy silane.

17. The nanocomposite according to Claim 1 wherein said resin is a monomer, polymer, oligomer or a combination of the like.

18. The nanocomposite of Claim 17 wherein said monomer is selected from the group consisting of acrylic acid monomers, methacrylic acid monomers, acrylate monomers, methacrylate based monomers, styrene monomers, vinyl ether monomers, acrylonitrile monomers, propylene monomers, vinyl acetate monomers, vinyl alcohol monomers, vinyl chloride monomers, vinylidine chloride monomers, butadiene monomers, isobutadiene monomers, isoprene monomers, divinyl benzene and mixtures thereof.

19. The nanocomposite of Claim 17 wherein said polymer is selected from the group consisting of polyamides, polyesters, polyolefins, polyimides, polyacrylate, polyurethane, vinyl esters, epoxy based materials, styrene, styrene acrylonitrile, ABS polymers, polysulfones, polyacetals, polycarbonate, polyphenylensulfidies and mixtures thereof.

20. The nanocomposite of Claim 17 wherein said oligomer is selected from a group consisting of acyrylic oligomers, methacrylic oligomers, styrene oligomers, vinyl ester oligomers, polyester oligomers and mixtures thereof.

21. A method of using resin-silicate layered nanocomposite for dental applications, the method comprising:

providing a resin-silicate layered nanocomposite, the nanocomposite comprising: a plurality of silicate platelets; one or more gallery regions spacing the silicate platelets; at least one surface modifier ion-exchanged to each silicate platelet; an intercalated

structure such that resin is absorbed into the gallery regions spacing the silicate platelets; and an exfoliated structure lying in a continuous resin matrix such that a solid nanocomposite is formed; and

using the resin-silicate layered nanocomposite in a dental application.

22. The method of claim 21, wherein the dental application includes use in dental composite restorative materials.

23. The method of claim 21, wherein the dental composite restorative materials are selected from the group consisting of sealants, core materials, adhesives, bonding agents, veneering materials, cements, dentures, inlays, microfill composites, flowable composites, compomers, anterior composites, posterior composites, resin modified glass ionomes, and condensable composites.

24. The method of claim 23, wherein the dental composite restorative materials can be light cured, self cured or combination thereof.

25. The method of claim 21, wherein the dental application includes use in dental appliances, orthodontic devices and appliances, bite plate appliances, denture base resins, temporary and permanent crowns and bridges.

26. The method of claim 21, wherein the dental application includes use in orthopedic appliances, acrylic prosthesis, bone cements, and adhesives.